**MicroLow\_Ice\_1.1 ReadMe**

James Bradley

Queen Mary University of London, UK

GFZ German Research Centre for Geosciences, Potsdam, Germany

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**1. Hardware and Software Requirement**

**MicroLow\_Ice\_1.1** is written and can be executed in the free open source computing environment and programming language R, which is available for download on the web (<http://www.r-project.org/>). The model uses the adaptive time-step solver “lsoda” from the deSolve package (Soetaert et al., 2010) **which must also be installed**.

**2. Download MicroLow\_Ice\_1.1**

A package named “MICROLOW\_ICE\_1.1\_source”, containing the source code of MicroLow 1.0 and validation data is available at https://github.com/jbradley8365/MICROLOW\_ICE\_1.1\_SOURCE.

The package contains:

The entire “MICROLOW\_ICE\_1.1\_SOURCE” folder should be copied to a local computer such that the directory is: “/Users/jamesbradley/Documents/RFolder/MICROLOW\_ICE\_1.1\_SOURCE” **or** the folder paths contained in ‘execute\_MICROLOW\_ICE\_1.1.R’ script should be modified (*setwd,* *path*, *pathte*) according to where the folder is copied to.

**3. Description of files**

This section provides a brief description of all files present in the folder “MICROLOW\_ICE\_1.1\_SOURCE”. This should be read alongside the following publication for clarity on variables, parameters, balance equations etc.:

Bradley J, Trivedi C, Winkel M, Mourot R, Lutz S, Larose C, Keuschnig C, Doting E, Halbach L, Zervas A, Anesio A, Benning L. Active and dormant microorganisms on glacier surfaces. *Geobiology*.

MICROLOW\_ICE\_1.1\_SOURCE **contents:**

*ReadMe.docx / ReadMe.pdf*

ReadMe guide to model source code and execution.

*execute\_* MICROLOW\_ICE\_1.1*.R*

Model source code, .R script.

*icetemp.csv*

Forcing data

**4. Model Operation**

In R, specify working directory to appropriate path e.g.: “Users/jamesbradley/Desktop/RFolder/ MICROLOW\_ICE\_1.1\_SOURCE/”

Open *execute\_* MICROLOW\_ICE\_1.1*.R* script and execute in console (note: package “deSolve” (Soetaert et al., 2010) must be installed).

**5. Output**

Model output is created as variables within a dataframe ‘out’. By default, output is not saved locally, however this can be done by using a command such as:

**write.table(out\_list[[1]],file=paste("out","nominal.csv",sep="\_"),sep=",",row.names=FALSE)**

The dataframe “out” contains the model results, with output provided for every thousand years simulated.

|  |  |
| --- | --- |
| **Variable** | **Description** |
| time | Model run time, hours |
| B1 | *B1*biomass |
| B2 | *B2* biomass |
| Corg | Dissolved organic carbon |
| c\_Cons\_Corg\_Growth\_B1 | *DOC* consumed by *B1* for growth, cumulative |
| c\_Death\_total | Death of *B1-2*, cumulative |
| c\_M\_total\_Corg | Exogenous maintenance of *B1-2*, cumulative |
| c\_M\_total | Exogenous maintenance of *B1-2*, cumulative |
| c\_M\_B1\_Corg | Exogenous maintenance of *B1*, cumulative |
| c\_Cons\_Corg\_total | Total consumption of *DOC*, cumulative |
| c\_Growth\_B1 | Growth of *B1*, cumulative |
| c\_Death\_B1 | Death of *B1*, cumulative |
| c\_B1\_D | Deactivation of *B1*, cumulative |
| c\_B2\_A | Activation of *B2*, cumulative |
| c\_Death\_B2 | Death of *B2*, cumulative |
| Btotal | Total biomass (*B1-4*) |

**References**

Soetaert, K., Petzoldt, T., and Setzer, R. W. (2010). Solving Differential Equations in R: Package deSolve. *J. Stat. Softw.* 33, 1–25.